

**TECHNICAL TRAINING PUBLICATION**

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FAULT DESPATCH CENTRES**BASIC FUNCTIONS AND PROCEDURES**

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1. INTRODUCTION

1.1 Before the introduction of Fault Despatch Centres (F.D.Cs) in capital cities, substation equipment and line plant in these areas were, in general, tested and maintained by staff based at the associated exchanges.

1.2 When F.D.Cs were introduced, the responsibility of testing subscribers services was taken from the large number of exchanges which performed that function and was given to a smaller number of centrally located centres, which also were given control of the lines and substation faultmen.

The main advantages of centralised testing and fault despatch are:

- an overall greater manhour efficiency;
- more specialised attention given to faults and to testing;
- closer supervision of faultmen;
- closer control over the handling of all faults.

1.3 The advantages gained by the centralisation of testing and lines-substation maintenance has been realised. Further, the administration of these activities has been greatly simplified because of its concentration to a few centres. Subscribers have also benefitted from the change because time commitments, quality of workmanship and attention to services are virtually uniform over the whole metropolitan area.

1.4 Although all F.D.Cs perform essentially the same functions, the procedures in all centres are not identical. This is because of variations in size, the type of work load and geographical area and differences in the stage of evolution.

1.5 This publication describes, in general terms, the functions and fault handling procedures at a typical F.D.C.

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2. SYSTEM DESCRIPTION

2.1 OUTLINE OF SYSTEM. Fig. 1, attached, is a flow chart showing briefly the fault handling procedure at a typical F.D.C.

2.2 SUBSCRIBERS COMPLAINTS. A subscriber who has a telephone service out of order or damaged, or is having difficulty in dialling a number, reports the complaint to the service difficulties and fault section. In Fig. 1 this section is referred to as the service assistance centre.

The service assistance operator classifies the complaint into three categories:

- **Technical Assistance.** These are reports which appear to relate to switching equipment malfunction, e.g. 'cut-off', 'no progress', 'wrong number', 'triple connection' or 'busy during dialling', and are forwarded to the network performance analysis centre (NPAC) for further analysis.
- **Telephone Service Assistance.** Complaints such as 'subscriber wanted does not answer', 'subscriber busy speaking', which do not refer to plant failure, are dealt with to finality by the service assistance operator.
- **Technical Repair Requests.** A report relating to damaged or malfunctioning substation or lines equipment would be classified into this category, and the report is forwarded to the F.D.C. responsible for maintenance of that telephone service.

In this publication, discussion will be restricted to the category that involves the F.D.C., namely, technical repair requests.

2.3 F.D.C. NOTIFIED OF COMPLAINT. After the subscribers complaint is recorded by the service assistance operator, the information is forwarded to the F.D.C. records room where the clerical staff:

- issue and attach a fault docket to the subscribers master card;
- convey the fault docket and master card, for all services except public telephones (refer Section 2.17), to the testing positions.

2.4 TESTING THE SUBSCRIBERS SERVICE. On receiving the fault docket and master card, the testing officer:

- inspects the fault history on the back of the master card and notes on the fault docket if a special inspection is required at a later stage of the fault handling procedure;
- tests the subscribers service to ascertain the cause of the complaint;
- records the result of the test on the fault docket;
- allocates and records on the fault docket a fault clearance priority in accordance with the priority afforded to the subscriber and the type of fault affecting the telephone service;
- assigns the fault docket to one of three areas, lines, substation or exchange.

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2.5 DESPATCHING SUBSTATION FAULTMAN. When the fault docket and master card arrive from the testing officer, the substation fault despatch officer:

- allots a numbered magnet, appropriately coloured to indicate the fault priority, to the fault;
- notes the magnet number on the fault docket;
- places the allotted magnet on the metal-backed map at the point corresponding to the subscribers geographic location;
- places the fault docket and master card in the substation fault despatch console compartment corresponding to the allotted magnet number;
- assigns the fault to a substation faultman, taking into account the priority and geographical location of the fault and the position of the faultman in relation to the fault;
- advises the substation faultman of all details and tests made on the faulty telephone service;
- transfers the numbered fault magnet from the map, after the fault details are given to the substation faultman, and places it adjacent to a larger numbered magnet which identifies the faultman to whom the fault is given. This indicates that the fault has been given to a faultman;
- transfers the fault docket and master card to the substation fault despatch console compartment corresponding to the substation faultman's identification number.

2.6 SUBSTATION FAULTMAN. On arriving at the subscribers premises, the faultman talks to the subscriber about the complaint and carries out functional tests on the equipment to ascertain if the fault still exists. The faultman then diagnoses the fault and proves the fault into one of the following three areas:

- **Exchange.** If the faultman proves the fault into the exchange equipment, he advises the substation fault despatch officer. The substation fault despatcher records the result of the faultman's test on the fault docket and transfers the fault docket and master card from the substation fault despatch console to the exchange fault despatch officer, and removes the numbered magnet allocated to that fault from the map. The substation faultman is then deployed by the substation fault despatcher to the next fault.
- **Line.** If the faultman proves the fault "to line", he advises the substation fault despatch officer. The substation fault despatcher records the result of the faultman's test on the fault docket and transfers the fault docket and master card from the substation fault despatch console to the lines fault despatch officer, and removes the numbered magnet allocated to that fault from the map. The substation faultman is then deployed by the substation fault despatcher to the next fault.
- **Substation.** If the faultman proves the fault into the substation equipment or wiring, he rectifies the fault and after testing the functions of the equipment, to check that the original fault has been removed and that no other faults have developed while the equipment was being worked on, the faultman notifies the substation fault despatch officer.

2.7 CLEARANCE ADVICE FROM SUBSTATION FAULTMAN. When the faultman advises of the fault clearance, the substation fault despatch officer:

- records the fault clear code and other relevant information on the fault docket and the back of the master card;
- inspects the fault history on the back of the master card and notes if a special inspection is now required (detailed in Section 2.18);

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- removes the numbered magnet allocated to that fault from the map;
- deploys the faultman to the next fault, as detailed in Section 2.5;
- conveys the fault docket and master card to the records room.

2.8 CLEARANCE OF FAULT DOCKET. The clerical staff replaces the master card in the master card file and stores the fault docket for subsequent sorting and counting for statistical purposes and compiling of reports for the officer-in-charge and the engineer.

2.9 DESPATCHING LINES FAULTMAN. When the fault docket and master card arrive from the testing officer, the lines fault despatch officer:

- allots a numbered magnet, appropriately coloured to indicate the fault priority, to the fault;
- notes the magnet number on the fault docket;
- places the allotted magnet on the metal-backed map at the point corresponding to the subscribers geographic location;
- places the fault docket and master card in the lines fault despatch console compartment corresponding to the allotted magnet number;
- assigns the fault to a lines faultman, taking into account the priority and geographical location of the fault and the position of the faultman in relation to the fault;
- advises the lines faultman of all details, including cable particulars and type of fault;
- transfers the numbered fault magnet from the map, after the fault details are given to the lines faultman, and places it adjacent to a larger numbered magnet which identifies the faultman to whom the fault is given. This indicates that the fault has been given to a faultman;
- transfers the fault docket and master card to the lines fault despatch console compartment corresponding to the line faultman's identification number.

2.10 LINES FAULTMAN. The faultman localises the fault into a section of line or cable by testing at test points, e.g. terminal units (terminal box, pillar/cabinet), openable plastic joints, etc., where the faulty pair is readily accessible for testing.

The testing consists of opening the circuit and proving in which line or cable section the fault exists, i.e. towards the exchange from the testing point or away from the exchange.

Should the fault prove to be in the substation or exchange equipment the lines faultman advises the lines fault despatch officer. The lines fault despatcher records the result of the faultman's test on the fault docket and transfers the fault docket and master card from the lines fault despatch console to either the exchange or substation fault despatch officer, and removes the numbered magnet allocated to that fault from the map. The lines faultman is then deployed by the lines fault despatcher to the next fault.

When the fault proves to be in the line or cable, the faultman uses alternative methods of clearance depending on the location and extent of the fault. Briefly these are:

- repair or replace terminal units, subscribers lead-in connections (drop-wire, cable), or a section of small size distribution cable;

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- transfer the service from the faulty pair to a spare pair;
- if the fault is proved into a large cable, or the extent of the fault is larger than first anticipated and is beyond the scope of one faultman, the lines fault despatcher is advised and alternative arrangements are made to clear the fault.

The faultman, after clearing the fault and receiving a clearance test from a testing officer (to check that the fault has been removed), notifies the lines fault despatch officer.

2.11 CLEARANCE ADVICE FROM LINES FAULTMAN. When the faultman advises of the fault clearance, the lines fault despatch officer:

- records the fault clear code and other relevant information on the fault docket and the back of the master card;
- inspects the fault history on the back of the master card and notes if a special inspection is now required (detailed in Section 2.18);
- removes the numbered magnet allocated to that fault from the map;
- deploys the faultman to the next fault, as detailed in Section 2.9;
- conveys the fault docket and master card to the records room;
- when advised by the faultman that the location or nature of the fault is beyond the scope of one faultman, arranges for other lines staff to be assigned to the fault.

2.12 CLEARANCE OF FAULT DOCKET. The clerical staff replaces the master card in the master card file and stores the fault docket for subsequent sorting and counting for statistical purposes and compiling of reports for the officer-in-charge and the engineer.

2.13 FAULT ADVICE TO EXCHANGE FAULTMAN. When a fault is suspected or proved into an exchange, one testing officer, who has been nominated to perform the function of exchange fault despatch officer:

- records the fault in a log book;
- forwards all fault details over the order wire to the relevant exchange;
- places the fault docket and master card in the test console compartment for that exchange.

2.14 EXCHANGE FAULTMAN. The faultman first proves if the fault is in the exchange or out of it.

If the fault is proved to be out of the exchange and in the line or substation equipment, the faultman notifies the exchange fault despatcher who records the result of the faultman's test on the fault docket and transfers the fault docket and master card from the test console to either the lines or substation fault despatch officer.

When the fault proves to be in the exchange, the faultman rectifies the fault and after testing the functions of the equipment, to check that the original fault has been removed and no other faults have developed, the faultman records the fault details on his exchange equipment fault docket and reports the fault clearance details, via the order wire, to the exchange fault despatcher.

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2.15 CLEARANCE ADVICE FROM EXCHANGE FAULTMAN. When the faultman advises of the fault clearance, the exchange fault despatch officer:

- records the fault clear code and other relevant information on the fault docket and the back of the master card;
- "signs off" the fault in the log book;
- inspects the fault history on the back of the master card and notes if a special inspection is now required (detailed in Section 2.18);
- conveys the fault docket and master card to the records room.

2.16 CLEARANCE OF THE FAULT DOCKET. The clerical staff replaces the master card in the master card file and stores the fault docket for subsequent sorting and counting for statistical purposes and compiling of reports for the officer-in-charge and the engineer.

2.17 PUBLIC TELEPHONE REPORTS. If the report is other than "coins no service", for which no refund is claimed, it is dealt with by the clerical staff in the same way as a normal subscribers repair request except that it is not referred to the testing officer. It is sent directly to the substation fault despatch officer.

If the report is a "coins no service", the fault docket and master card are placed in suspense (a holding compartment where the fault docket and master card are held waiting subsequent reports, to check that the complaint is genuine).

If no further report is received within a predetermined time, which is dependant on the calling rate of that public telephone and is shown on the master card, the fault docket is given a clearance code and action similar to that described in Section 2.8 takes place.

If a further report is received before the predetermined time has elapsed, then both fault dockets and the master card are conveyed to the substation fault despatch officer. The procedure followed is similar to that described in Sections 2.5 - 2.8.

2.18 ISSUING A SPECIAL INSPECTION DOCKET. Fig. 2 attached, illustrates briefly a typical procedure for telephone services that qualify for special attention and under certain circumstances, require a special inspection.

After the fault clearance has been given by the faultman to his fault despatch officer, the despatcher inspects the fault history on the back of the master card and observes if there has been the required number of repair requests over a specified period which qualifies this telephone service for further attention. If the service qualifies, the despatcher forwards the completed fault docket (endorsed, special inspection required) and the master card to the technical officer nominated to perform the functions of special inspection officer.

The first action of the special inspection officer is to establish whether a special inspection is necessary. To determine this, the special inspection officer:

- re-tests the telephone service to observe if any fault conditions exist;
- questions the subscriber to determine the subscribers attitude towards the quality of the telephone service and in particular to the period after the last service call.

After contacting the subscriber, the special inspection officer categorises the telephone service into one of the following three areas:

- subscriber satisfied with telephone service - no action necessary;
- fault now O.K. - further action doubtful;
- subscriber not satisfied with telephone service - further action necessary.

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NO ACTION NECESSARY. Where it is obvious that the reason for the repair request has been remedied and the subscriber is satisfied with the telephone service, the special inspection officer:

- endorses the back of the master card, no special inspection required;
- conveys the master card and fault docket to the records room, where they are filed and cleared.

FURTHER ACTION DOUBTFUL. Where it is likely that the cause of the subscribers complaint has been remedied, but some doubt of this exists, the special inspection officer:

- records details in the special inspection register against the next unallocated serial number and marks it, pending;
- endorses the back of the master card, special inspection docket No. pending;
- conveys the master card and fault docket to the records room, where they are filed and cleared.

After a pre-determined time, the special inspection officer:

- contacts the subscriber to determine the quality of the telephone service during the period from the first special inspection subscriber contact.

If no further trouble has occurred and the subscriber is satisfied with the telephone service, the special inspection officer:

- clears the entry in the register as, no action required;
- endorses the back of the master card, no special inspection required.

If the subscriber is not completely satisfied or a further fault report is received, the special inspection officer:

- records details in the special inspection register against the next unallocated serial number;
- clears the previous pending entry in relation to this subscriber with the new serial number just issued;
- endorses the back of the master card, special inspection docket No. issued;
- issues a special inspection docket;
- directs the docket to the relevant plant section (lines, exchange or substation).

FURTHER ACTION NECESSARY. Where after the first interview, action is necessary to rectify the subscribers complaint, the special inspection officer:

- records details in the special inspection register against the next unallocated serial number;
- endorses the back of the master card, special inspection docket No. issued;
- conveys the master card and fault docket to the records room, where they are filed and cleared;
- issues a special inspection docket;
- directs the docket to the relevant plant section (lines, exchange or substation).

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2.19 PROCESSING OF A SPECIAL INSPECTION DOCKET. Special inspection of lines, exchange equipment or substation equipment is carried out as follows:

- **Lines Inspection.** The special inspection docket is sent to the officer-in-charge of the line depot, in the area that the subscriber is located, and it is the duty of that officer to arrange for a thorough inspection of all the external plant connected to the service.
- **Exchange Equipment Inspection.** The special inspection docket is sent to the officer-in-charge of the exchange, to which the subscriber is connected, and it is the duty of that officer to arrange a thorough inspection of all items of exchange equipment relevant to that subscriber.
- **Substation Equipment Inspection.** The inspection is performed by a substation officer specifically delegated for this duty. The subscribers premises is visited and the subscriber interviewed. The equipment and wiring are thoroughly checked.

Where an inspecting officer can find no fault, the special inspection docket is returned to the F.D.C. and re-directed for a further inspection in another plant section, if the special inspection officer considers this desirable.

When action to clear the special inspection docket is complete, the docket is returned to the F.D.C. and the special inspection officer:

- records the clearance details in the special inspection register;
- holds the special inspection docket for a pre-determined time.

At the end of that period, the subscriber is again contacted to ensure his complete satisfaction with the telephone service.

If the subscriber is satisfied with the quality of the telephone service, the special inspection officer:

- records the subscribers remarks on the special inspection docket;
- enters the clearance details on the back of the master card;
- forwards the completed special inspection docket via the officer-in-charge of the F.D.C. to the service division concerned.

If the subscriber is not completely satisfied with the quality of the telephone service, the special inspection officer:

- arranges for another inspection of the line plant, exchange equipment or substation equipment by a higher grade officer who will forward a report on his findings;
- on receiving the second report, finalises the clearance as detailed in the preceding paragraph.

2.20 TYPICAL ORGANISATION. An organisation chart of a typical F.D.C. is shown in Fig. 3 attached.

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3. MANAGEMENT CONTROL

3.1 PURPOSE. A continuous oversight of staff and plant performance is required for the following purposes:

- To ensure that an adequate service is being given to subscribers.
- To ensure that staff are being used effectively and economically.
- To facilitate the estimating of future staff requirements.
- To determine where training of staff is needed.
- To pin-point plant weaknesses.

3.2 DATA INFORMATION. The following data from each centre is available to management as an aid to assess staff and plant performance and the quality of the service given to subscribers.

- The average number of visits made by each faultman per day.
- The average number of faults carried over from one day to the next.
- The average number of repair requests handled by the staff at the fault despatch consoles.
- The average number of repair requests handled per day by the F.D.C.
- The average distance travelled by vehicle per visit made.
- Histograms showing the percentage number of faults cleared in different time intervals.
- The number of ordinary service repair requests per 100 telephones.
- The number of public telephone repair requests per 100 instruments for each type of public telephone.

3.3 AUTOMATIC LINE FAULT ANALYSIS (ALFA). ALFA is an external plant fault recording system that obtains its information on a special card. An ALFA card is completed for each external plant fault that is cleared and the information is fed into a computer for analysis and a print out.

The purpose of the ALFA system is to provide management with additional information which will assist them to:

- identify plant or services with high fault incidences;
- provide a measure of the workload so that the available maintenance resources can be effectively allocated;
- detect trends and decide priorities for maintenance project work;
- provide a broad indication of the distribution of faults over various types of plant which may be due to bad installation design and practices etc.

The data information available from the ALFA system is divided into four groups. Briefly they are:

- Location Plots. Lists the particulars of each fault per Division, Exchange, Distribution Area etc.
- Plant Performance Reports. Provides fault averages, such as faults per 100 sheath miles of cable per quarter for various areas.
- Fault Clearance Time Reports. Provides per line district, a measurement of service. Provides data for fault control and effectiveness of fault restoration and prevention efforts.
- Matrix Reports. A cross analysis per State or Division of the type, item, location, defects and causes of faults in each fault category. The main types and areas of faults are quickly apparent. Very effective when used to plan maintenance programmes and check material performance, design effectiveness and standards of workmanship.

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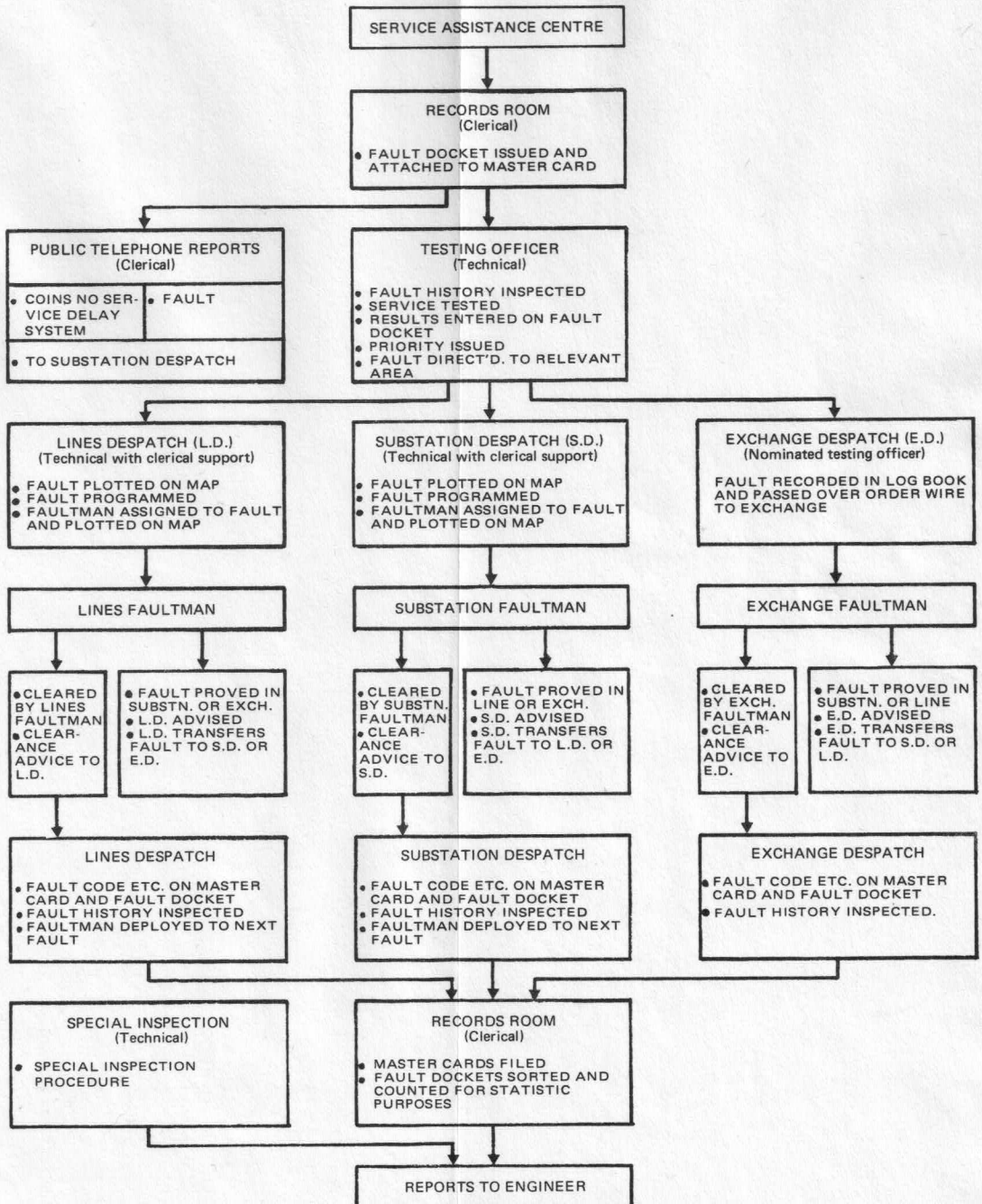


FIG. 1. FAULT HANDLING PROCEDURE AT A TYPICAL FAULT DESPATCH CENTRE.

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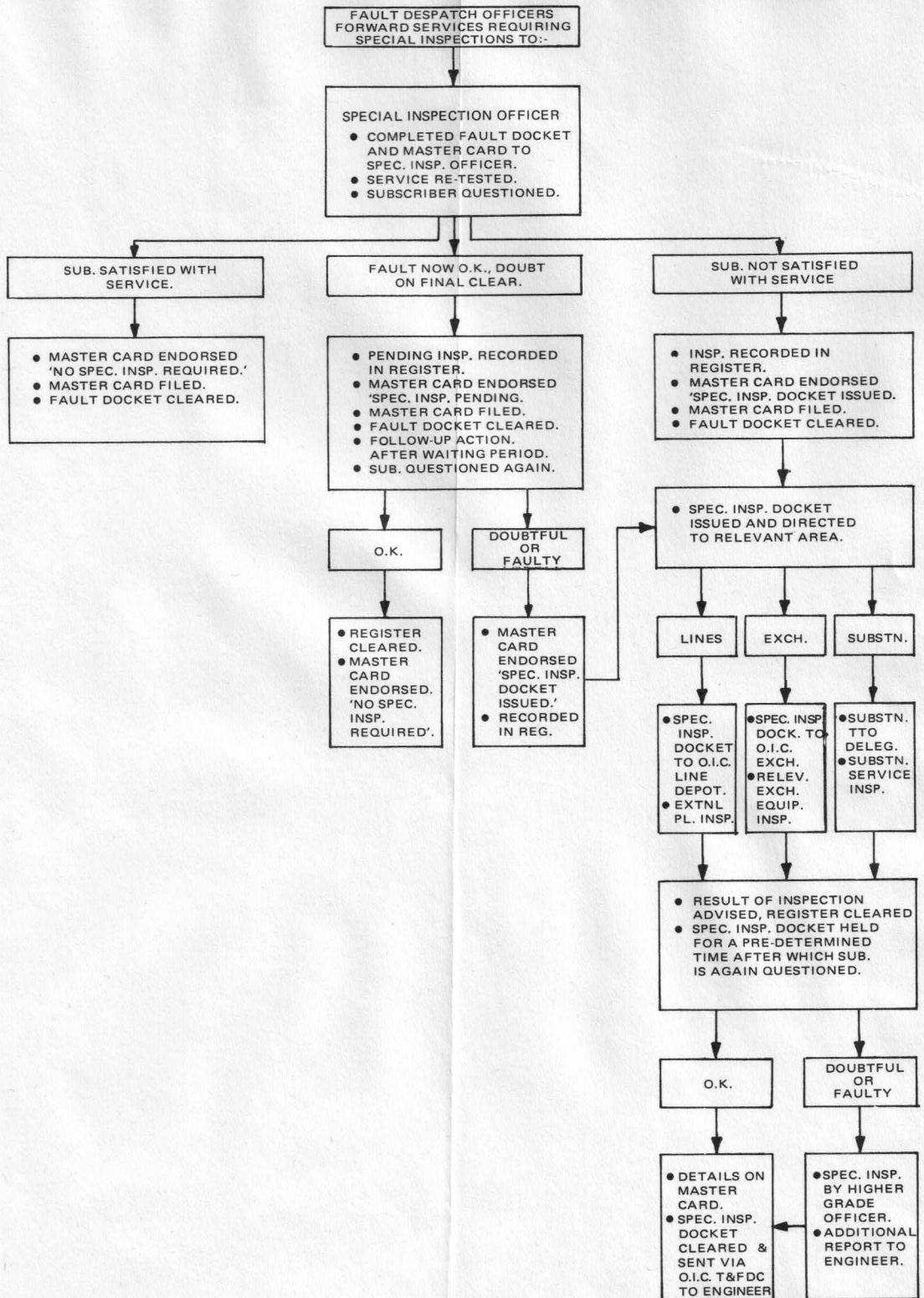


FIG. 2. TYPICAL SPECIAL INSPECTION PROCEDURE.

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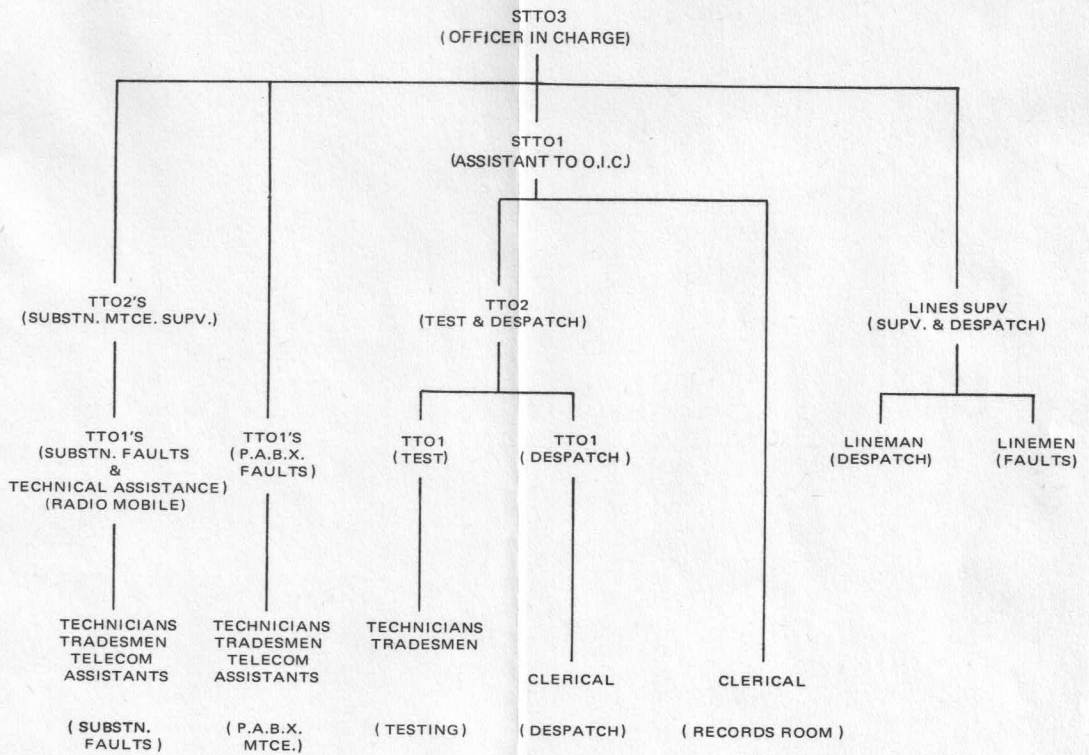


FIG. 3. ORGANISATION CHART OF A TYPICAL FAULT DESPATCH CENTRE.